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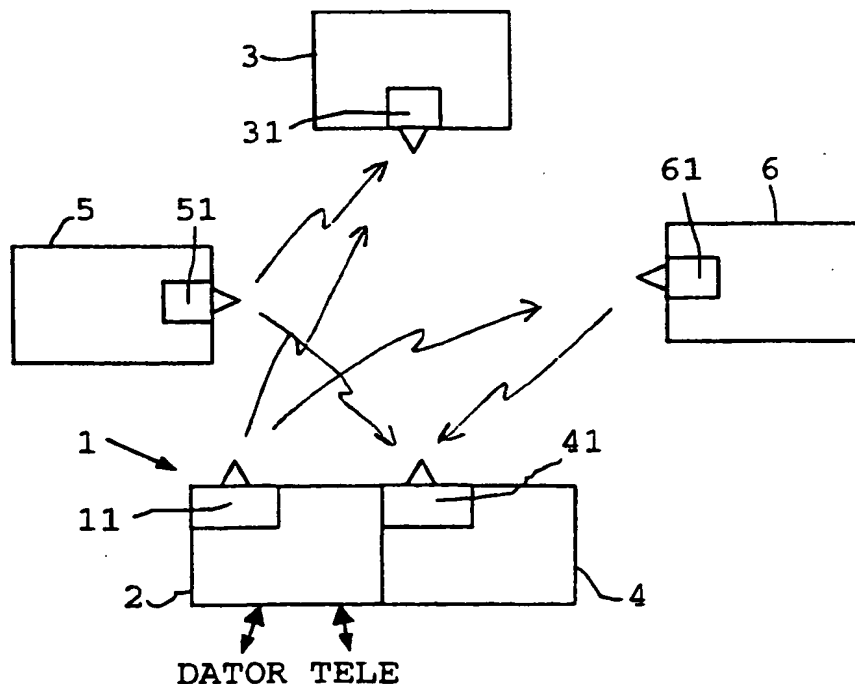
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: REMOTE CONTROL SYSTEM

## (57) Abstract

A system is composed of a plurality of electric actuators that make it possible to control electrical appliances and equipment, such as lamps, heaters, fans, air-conditioning, etc. The actuators contain receivers for control signals and are normally not provided with transmitters that indicate the actuators status. The system also includes a local communications unit or server that can, first, communicate with the actuators via a transmitter, second, store information, via a supervision unit, about the status of units forming part of the system, third, has the capacity to communicate with a computer or via a telecommunications circuit, and may further include additional functions. One purpose is to bring about a system in which the same constitutive components can be controlled and read off by at least two of four different methods. This occurs preferably via a remote control with a range of 25-100 metres and either via a telephone interface that controls actuators by remote control or via a locally connected computer, e.g. a PC communicating with the system. In addition, direct control is possible on the product itself or via the circuit breaker on the connected appliance.



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TITLE: REMOTE CONTROL SYSTEM.

In this patent application, "system" shall mean devices that work in co-ordination with one another.

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The system as based on the present invention is composed of a plurality of electric actuators that make it possible to control electrical appliances and equipment, such as lamps, heaters, fans, air-conditioning, etc. The actuators may be provided with a simple on-off switch, but they may also contain instruments for power adjustment and other functions. The actuators contain receivers for control signals and are normally not equipped with transmitters that indicate the actuators' status. The system may also comprise separate sensor units for sensing various conditions, such as temperature, light, humidity, etc., the sensors being connected to transmitters to permit the transmission of signals. The system also includes a local communications unit or server that is capable, first, of communicating with the actuators via a transmitter, second, of storing information, via a supervisory unit, about the status of units forming part of the system, third, has the capacity to communicate with a computer and via telecommunications circuits, and may, further, include additional functions.

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One purpose of the present invention is to bring about a system in which the same constitutive components can be controlled and read off by at least two of four different methods. This is preferably to occur by means of a remote control with a range of approximately 25 - 100 metres, and either by means of a telephone interface that adjusts control units by remote control and reads off sensors, or by means of a locally connected computer, e.g. a PC that communicates with the system. By preference, both telephone interface and the possibility of connecting a local computer to the system are included. In addition, direct control is possible on the product or by means of the circuit breaker on the connected appliance.

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Another purpose of the invention is to make use of a connected memory processing card equipped with transmitter and receiver that registers control signals and sensor data when they are sent within the system from the remote control, actuators, PC or modem data. The memory processing card with transmitter and receiver allows the actuators to be controlled from the remote control, while the status of the actuators can be read at a later point in time from a remote connection even though the actuators are normally not equipped with transmitters. The memory card with transmitter and receiver can also be employed as a repeater so as to increase the range when remote control is used.

A further purpose is that the signal that is repeated from the memory card with transmitter and receiver is coded so that the actuators are able to determine whether the signal is a repeated or direct signal. This makes it possible to send relative commands to the actuators in the case of, e.g., a progressive adjustment, the actuators only reacting to a repeated signal if they have not been reached by the direct signal.

A system based on the invention makes it possible to control electrical appliances and read sensors from differing locations. By preference, control is exercised via a remote control with limited range, or else remote control/reading takes place via a communications connection that enables very long distance communication. Control or reading off is also possible directly on the actuator or sensor respectively, or by means of control via a locally connected computer, e.g. a PC. The same actuators or sensors can be controlled and gauged locally or from a distance without the actuator or sensor needing to be affected or altered. All actuators and sensors have their own unique address, which preferably consists of or includes an IP address or a part of such an address. The status of the actuators and sensors is registered by a central transmitter/receiver equipped with memory when they are affected by remote control or a remote transmitter/receiver. This makes it possible for the status

of the actuators to be read off by remote without the actuators needing to contain transmitters.

5 The range of the system is increased and disturbances can be reduced by control signals to actuators always being saved in the central memory with radio transmitter and receiver (transceiver) and being repeated from this unit. When the signal is repeated from the central transceiver, it is encoded to enable the actuator to determine whether the  
10 signal is a repeated signal coming from a transceiver or a control signal from a remote control. This makes it possible to send relative data, for example to an actuator that has the capacity to adjust the power supplied to lighting (a dimmer). When the command "increase light" is sent from the  
15 remote control, it is sent directly to the actuator but will also be received by the central transceiver, which sends data on to the same actuator. In order not to receive the command "increase light" twice, thus leading to a twofold increase, the actuator reads and interprets the signal that has been  
20 sent and by means of the coding in the central transceiver can only "increase light" once.

The above aims and purposes of the invention have been accomplished by giving it the design stated in the following  
25 claims for patent.

One embodiment of the invention will now be described in greater detail with reference to the drawing.

30 Figure 1 shows in schematic form the main features of a system based on the invention.

Figure 2 shows in schematic form the composition of a communications unit based on the invention.

35 Figure 3 shows in schematic form the composition of an actuator intended for use in a system based on the invention.

Figure 4 shows in schematic form the composition of a remote control unit intended for use in a system based on the invention.

Figure 5 shows in schematic form the composition of a sensor unit intended for use in a system based on the invention.

- 5 Figure 1 shows in schematic form one version of a system for controlling electrical lamps, appliances or other loads that is based on the present invention. A communications unit 1 (figures 1 and 2) is equipped with connector devices 12 and 14 to allow connection to a computer 13 or telecommunications circuit 15, respectively. By means of the telecommunications connection 14, the communications unit 1 can be linked up to a normal telephone, a mobile telephone, a remote computer or IP server for communication via Internet. The connector devices 12 and 14 make it possible to control the system and to monitor the status of the system, but the communications unit can also function without the assistance of a computer or other equipment that is connected to it either directly or via telecommunications.
- 20 In functional terms, communications unit 1 consists of two components, a control unit 2 that includes a transmitter 11, and a supervisory unit 4 that includes a receiver 41. The transmitter 11 and receiver 41 constitute parts of a local communications system that in addition includes remote control transmitters 51 in remote controls 5 and actuator receivers 31 in actuators 3. The system may also include sensor units 6 (figure 5) with appertaining sensor unit transmitters 61. A sensor unit 6 can contain one or more sensors 65 for monitoring various conditions such as temperature, light, humidity, movement, appliance status, etc., and is equipped with sensor unit transmitter 61 and generally also sensor unit receiver 62. In its simplest form, sensor unit 6 can consist of a circuit breaker, the condition of which is reported to communications unit 1 either via the sensor unit transmitter 61 or directly.

All transmitters and receivers in this local system work by preference with radio waves with a common high frequency and short range. Alternatively, some other technique for local

cordless communication is employed, such as ultrasound or IR technology. As an alternative to cordless communication, communication can take place in part via a local computer network, which may be fibre-optic, or the electrical power network. It is only communication from the remote control to the communications unit that needs to be cordless, but it is not essential that any remote control be included in the system.

10 The supervisory unit 4 that forms part of communications unit 1 contains, in addition to the receiver 41, memory device 42 for storing the most recently received signals sent to each receiver address code belonging to the system, plus the most recently received signals from each sensor unit 6. The  
15 information in the memory device 42 in the supervisory unit 4 is used by the control unit 2 in the following manner. A programme unit 16 that is part of the control unit 2 prompts control device 21, which is part of the control unit, for example to retransmit via the transmitter 11 a new signal  
20 that has been received by the receiver 41 and stored in the memory device 42. The control device 21 can also influence the transmitter 11 via communication with a connected computer 13 or telecommunications circuit 15. In addition, the control device 21 can emit control signals by reading the  
25 programme unit 16 or being influenced by that unit, and/or by reading the memory device 42.

When the communications unit's transmitter 11 emits a message, its receiver 41 is normally turned off. If the  
30 message is new and does not come from the supervisory unit's memory device 42, it is sent by the control device 21 to the memory device 42 at the same time as it is sent out by the transmitter 11. Although the communications unit 1 has been shown in the figures divided into a control unit 2 and a  
35 supervisory unit 4, this is primarily in order to illustrate the function of the communications unit 1. The latter is preferably constructed as a single unit in which, for example, the transmitter 11 and the receiver 41 consist of the transceiver mentioned previously.

As shown by figure 3, an actuator 3, in one version of the invention, is composed essentially of an actuator receiver 31 for receiving signals by cordless means or via some type of cable. The received signal is compared in an address control unit 32 with the actuator's address, which is stored in memory. If the address matches, a control signal 33 goes on to a regulator unit 34, which controls a load 35. Depending on the desired function, the regulator unit 34 is designed or programmed to carry out everything from simple on - off switching, to increasing or diminishing voltage or current, to more advanced regulation functions.

Normally, the actuators 3 have a pre-programmed, fixed address. Programmes can be added for new extra addresses from a computer or via a telephone, using the communications unit.

As shown by figure 4, a remote control unit 5 in one version of the invention is composed essentially of an input device 52, which normally consists of a keypad, an encoder 53, which by means of an address memory 54, which contains addresses selected using the keypad, emits an output signal 55 consisting of an address and a modification command pertaining to it, e.g. on, off, increase, decrease. By means of the remote control transmitter 51, the output signal is transmitted to the communications unit's receiver 41 and, if this is within range of the remote control transmitter 51, also to the actuator to which this particular signal is addressed.

Figure 5 shows in schematic form one possible composition of a sensor unit 6, with a sensor 65, an encoder 63 and a sensor unit transmitter 61. The status of the sensor 65 is encoded by the encoder 63 as a signal that, first, indicates the status of the sensor 65 and, second, identifies the particular sensor unit involved, and this signal is sent on by the sensor unit transmitter 61. The sensor unit is also preferably equipped with a sensor unit receiver 62 that receives control signals, and a decoder 64 that identifies



any signals received and sends a control signal intended for the relevant control unit on to the encoder 63. Alternatively, the sensor unit receiver 62 and decoder 64 can be eliminated, in which case the sensor unit is constructed so as to emit output signals when the status of the sensor 65 changes or when other conditions are fulfilled, e.g. at regular time intervals. A sensor unit 6 and an actuator 3 can be constructed as a single unit, in which case conditions sensed can also influence the functioning of the actuator directly.

A system for controlling electrical lamps and appliances based on the invention consequently comprises at least one communications unit that can be connected to a computer or remote connection and that contains a transmitter for emitting signals addressed to a variety of receivers. In addition, the system comprises at least two actuator receivers for the reception of signals from the transmitter, each actuator receiver being part of an actuator that contains devices that can be controlled by signals received and each actuator reacting solely to signals containing an address code specific to it. Further, the system includes a supervisory unit that is set up in connection with the communications unit, this supervisory unit containing receivers for receiving all signals emitted by all the different transmitters plus a memory device for storing the most recently received signals for each receiver address code.

The system can also comprise at least one remote control unit with a remote control transmitter for the cordless emission of signals addressed to the various receivers, the receiver in the supervisory unit also being designed to receive and store signals sent from the remote control to the different receiver addresses. Devices for controlling the communications unit's transmitter can also be set up in connection with the supervisory unit. These devices prompt the transmitter to selectively retransmit signals received by the supervisory unit, and the supervisory unit can then also be set up to add or change a code so as to indicate that the

signals are retransmitted signals. When a receiver that is part of an actuator senses that the signal is a retransmitted signal it reacts to it, in the case of progressive control, only if it has not already received a corresponding signal from the remote control transmitter.

A communications unit based on the present invention that forms part of a system for controlling lamps and appliances by means of remote controlled actuators, comprises a transmitter for generating and sending signals made up of an address component and a message component, and a control device for controlling the transmitter by signals from a computer or from a mobile or fixed telecommunications circuit, and it is linked to a supervisory unit containing receivers for all signals emitted by any transmitter unit plus a memory device for storing the most recently received signals sent to each receiver address. In addition, the control device for controlling the transmitter can be affected by signals from a programme that is stored in the unit and/or from the receiver in the supervisory unit, so as to retransmit such signals as have been received from a remote control transmitter.

An actuator based on the invention for remote control of electrical lamps, appliances or other loads, comprises a receiver for receiving signals having an address component and a message component, and a unit for checking the address component, which, if the signal received contains an address component unique to the receiver concerned, sends the message component on as a control signal to a regulator unit that, depending on the content of the message component received, modifies the electrical load connected to the actuator. By preference, the address component consists of or contains an IP address or a part of such an address.

A remote control based on the invention for a plurality of actuators for electrical lamps, appliances or other loads can emit an address component that is unique for each actuator appertaining to it together with a message component, the

address components including complete IP addresses or parts of such addresses.

Other versions are also possible within the framework of the  
5 following claims for patent.

What is claimed is:

1. A system for control of electrical lamps and appliances characterized by it comprising

5       at least one communications unit (1) that can be connected to a computer (13) or a remote connection (15), and that contains a transmitter (11) for the emission of signals addressed to various receiver units (3, 6),

10       at least two actuator receivers (31) for receiving signals from the transmitter (11), each actuator receiver being part of an actuator (3) that contains devices (34) that can be controlled by signals received, and each receiver reacting only to signals containing an address code specific to it, which address code consists of or contains an IP  
15       address or a part thereof, and

20       a <sup>supervisory unit</sup> ~~supervisory~~ unit (4) that is part of the communications unit, which supervisory unit (4) contains devices for receiving all signals emitted by the transmitter (11) in the communications unit or any other transmitter included in the system, plus a memory device (42) for storing the most recently received signals for each receiver address code.

25       2. A system according to claim 1, characterized by it comprising in addition at least one remote control transmitter (51), forming part of a remote control (5), for the cordless emission of signals addressed to the various actuator receivers, the receiver (41) in the supervisory unit (4) also being set up to receive and store signals sent from  
30       the remote control transmitter (51) to various actuator receiver addresses.

35       3. A system according to claim 1 or 2, characterized by the memory device (42) in the supervisory unit (4) being set up in addition to work in co-ordination with control device (21) in order to control the transmitter (11) in the communications unit (1) in such a way that it selectively retransmits signals received by the supervisory unit (4) to some actuator.

4. A system according to claim 3, characterized by the control device (21) that controls the transmitter (11) in the communications unit (1), which selectively retransmits signals received by the supervisory unit (4), also adding or changing a code so as to indicate that the signals are retransmitted signals.

5. A system according to claim 1, characterized by the actuator receiver (31) that forms part of an actuator (3) sensing whether an incoming signal is a retransmitted signal and, in the case of progressive control, reacting to this signal only if it has not already received a corresponding signal from the remote control transmitter (51).

6. A communications unit forming part of a system for controlling lamps and appliances by means of remote controlled actuators, characterized by it comprising a transmitter (11) for generating and transmitting signals that comprise an address component and a message component, the address component preferably consisting of or including an IP address or part thereof, and a control device (21) for controlling the transmitter by means of signals from a computer (13) or from a mobile or fixed telecommunications circuit (15), and by it being linked to a supervisory device (4) containing a receiver (41) for receiving signals emitted by some transmitter (51, 61) plus a memory device for storing the most recently received signals sent to each receiver address.

7. A communications unit according to claim 6, characterized by the control device (21) for controlling the transmitter (11) being capable, further, of being influenced by signals from the receiver (41) forming part of the supervisory device (4) so as to retransmit such signals as have been received from a remote control transmitter (51).

8. A communications unit according to claim 6, characterized by the control device (21) for control of the

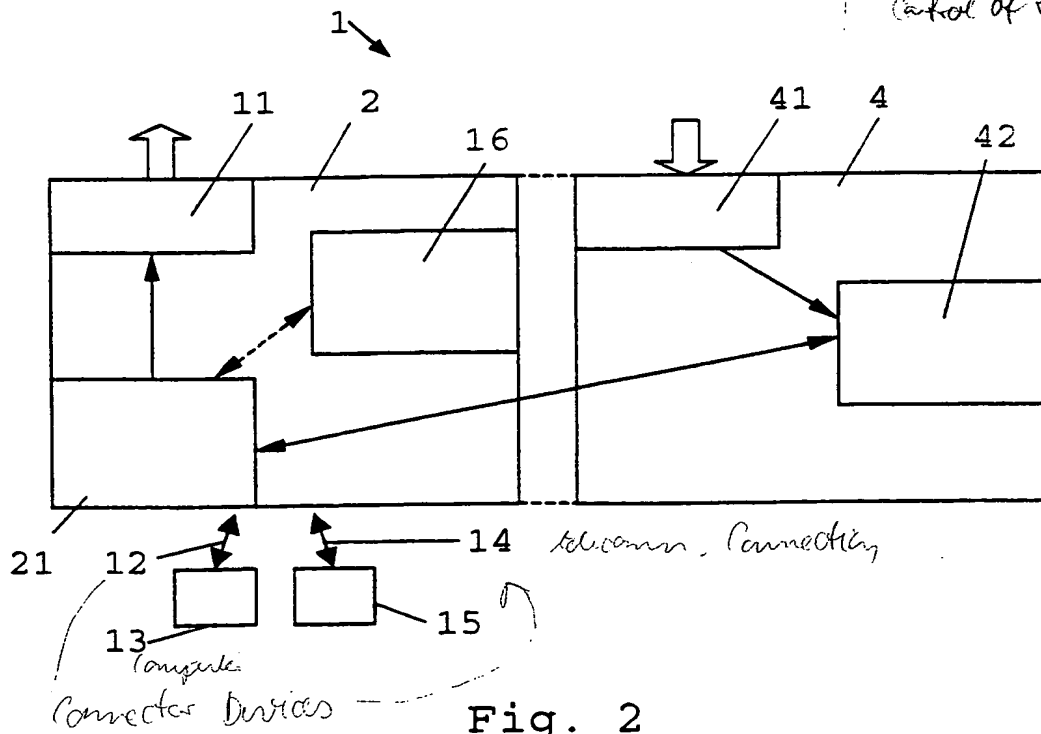
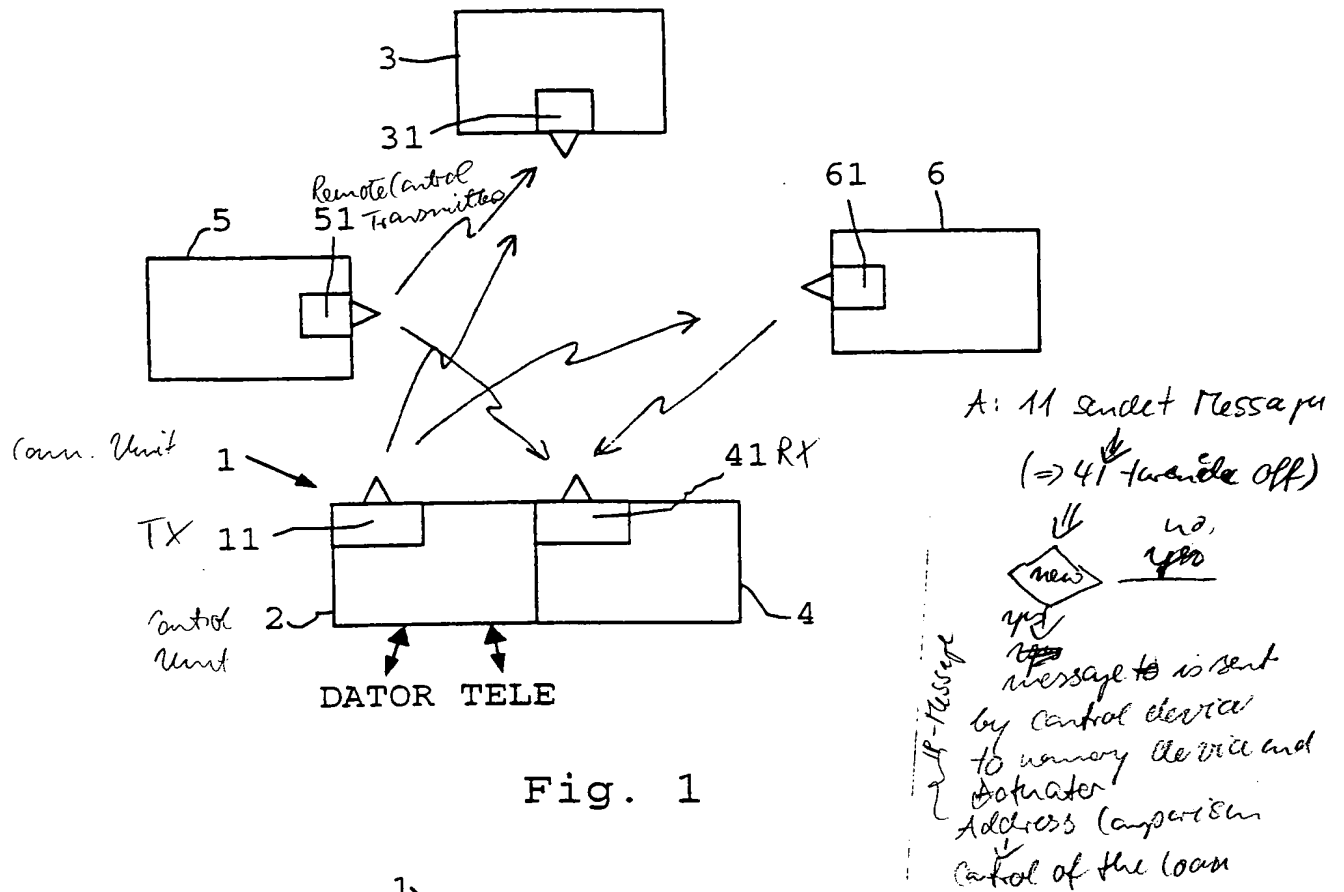
transmitter (11) being capable in addition of being influenced by signals from a programme stored in the unit.

5 9. An actuator for cordless remote control of electric lamps, appliances or other loads, comprising a receiver (31) for receiving signals that include an address component and a message component, and a unit (32) for checking the address component, which, if the signal received contains an address component unique to the receiver concerned, forwards the  
10 message component to a regulator unit (34) that, depending on the content of the message component received, directs it to the electric load (35) attached to the actuator, characterized by the address component consisting of or containing an IP address or part thereof.

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10. A remote control transmitter for cordless remote control of a plurality of actuators for electric lamps, appliances or other loads, this transmitter being capable of emitting an address component that is unique for each appurtenant  
20 actuator together with a message component, characterized by the address components including complete IP addresses or parts thereof.

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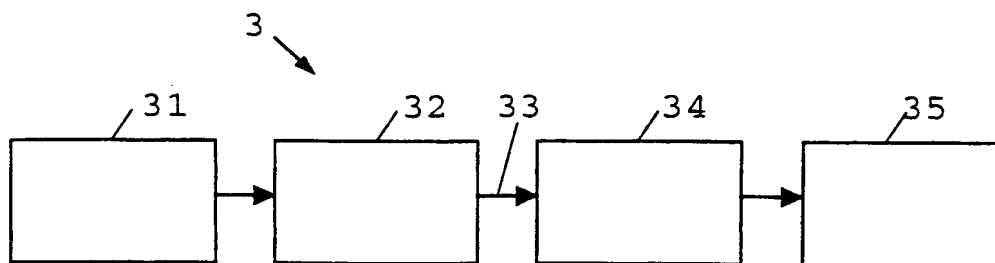


Fig. 3

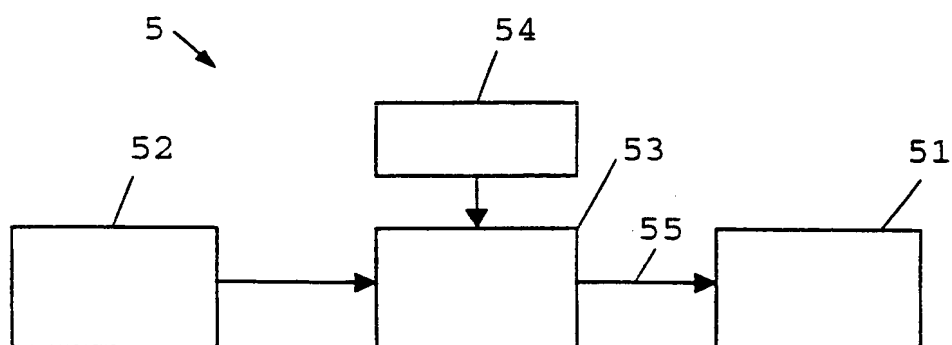


Fig. 4

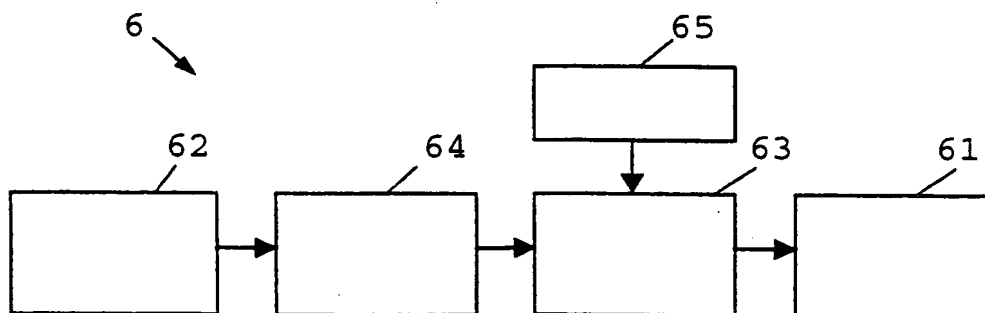


Fig. 5



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01475

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 9/00, H04M 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

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IPC6: G08C, H04M, H04Q

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Y	GB 2308910 A (BERNARD JOHN REGAN), 9 July 1997 (09.07.97), page 5, line 19 - page 6, line 9 --	1-10

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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International application No.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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